DOCUMENT RESUME

ED 302 824 CS 009 475

AUTHOR Vosniadou, Stella
TITLE Context and the Development of Metaphor Comprehension. Technical Report No. 444.
INSTITUTION Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Nov 88
CONTRACT OEG-0087-C1001
NOTE 16p.
PUB TYPE Reports - Research/Technical (143) -- Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Child Development; *Language Acquisition; Language Research; *Metaphors; Preschool Education; Reading Comprehension; Reading Research; Young Children
IDENTIFIERS *Context Effect; Knowledge Acquisition; *Metaphorical Thought; Situational Context

ABSTRACT

This paper argues that metaphor comprehension is an interactive process that involves reliance not only on the metaphorical linguistic input but also on the linguistic and situational context in which it occurs. A pilot study indicated that even preschool children appear capable of using the information provided by the linguistic and situational context to make inferences about the meaning of metaphorical sentences. The paper also argues that there is some evidence suggesting that young children can profit more from a situational context than a linguistic context in interpreting metaphors and that reliance on the situational and linguistic context decreases with increases in the knowledge base. Further research could substantiate these findings and investigate the mechanisms by which children make use of contextual information to construct the meaning of a metaphorical linguistic input. (Two tables of data are included and 24 references are attached.) (Author/RS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED302824

CENTER FOR THE STUDY OF READING

A READING RESEARCH AND EDUCATION CENTER REPORT

Technical Report No. 444

CONTEXT AND THE DEVELOPMENT OF METAPHOR COMPREHENSION

Stella Vosniadou
University of Illinois at Urbana-Champaign

November 1988

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

D. Anderson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

University of Illinois at Urbana-Champaign
51 Gerty Drive
Champaign, Illinois 61820

The work upon which this publication was based was supported in part by the Office of Educational Research and Improvement under Cooperative Agreement No. OEG 0087-C1001. The publication does not necessarily reflect the views of the agency supporting the research. This paper also appears in Metaphor and Symbolic Activity, in press.

CS009475

BEST COPY AVAILABLE

Abstract

It is argued that metaphor comprehension is an interactive process that involves reliance not only on the metaphorical linguistic input but also on the linguistic and situational context in which it occurs. Even preschool children appear capable of using the information provided by the linguistic and situational context to make inferences about the meaning of metaphorical sentences. These inferences help children decide when a linguistic input should be interpreted nonliterally and provide them with clues about the metaphor's implied meaning. There is some evidence suggesting that young children can profit more from a situational context than a linguistic context in interpreting metaphors and that reliance on the situational and linguistic context decreases with increases in the knowledge base. Further research is, however, needed to substantiate these findings and to discover the mechanisms thereby which children make use of contextual information to construct the meaning of a metaphorical linguistic input.

CONTEXT AND THE DEVELOPMENT OF METAPHOR COMPREHENSION

The question of how context affects the comprehension of metaphor has not received much attention in developmental research. In the usual metaphor comprehension task children of various ages are asked to explain or paraphrase figurative expressions, such as "Mary is sweet," "Her smile is bright sunshine," "A butterfly is a flying rainbow," "Plant stems are like drinking straws" out of context (e.g., Asch & Nerlove, 1960; Cometa & Eson, 1978; Winner, Rosenstiel, & Gardner, 1976). Studies such as these have shown that young children find it very difficult to comprehend metaphorical uses of language, and have reinforced the idea that metaphor comprehension is a complex skill that develops in late childhood or early adolescence.

The position I develop in this paper is that young children are capable of understanding metaphorical language and that what may appear as failure to understand is an artifact of the kinds of metaphorical expressions children are asked to paraphrase and the conditions under which they have to do so. More specifically, I argue that the context in which a metaphor occurs is an important determiner of comprehension and that even preschool children are capable of understanding metaphorical language if it occurs in an appropriate context.

My use of the term "context" corresponds roughly to what Clark and Carlson (1981) call "common ground." In other words, I assume context to be the common ground that holds between a speaker and a listener, and, more specifically, those aspects of this common ground that a listener needs to know in order to understand a given utterance.

Within such a framework one can distinguish between two kinds of context: An *extrinsic* context and an *intrinsic* context. The extrinsic context can be situational or linguistic. The situational context refers to the common ground that a speaker and a listener share physically; the things they can see, hear or touch. The linguistic context refers to the common ground created on the basis of the speaker's and the listener's previous linguistic communication; what has been said or what can be inferred on the basis of what has been said.

In addition to the situational and linguistic context a speaker and a listener may have common experiences or culturally shared knowledge. This common knowledge can be conceptualized as an intrinsic context, again to the extent that this is common knowledge necessary for the listener to understand a linguistic input. The intrinsic context depends on the listener's background knowledge, the knowledge stored in memory representations often referred to as scripts, schemata, mental models, etc. (Gentner & Stevens, 1983; Johnson-Laird, 1983; Rumelhart & Ortony, 1977; Schank & Abelson, 1977).

The focus of this paper will be on the effects of the extrinsic context on metaphor comprehension. I will argue that children can use the information provided by the linguistic and the situational context to draw inferences about the possible meaning of a metaphorical linguistic input. These inferences can facilitate or hinder metaphor comprehension, depending on whether they agree or not with the meaning that needs to be derived from the metaphorical input itself. The effect of the extrinsic context appears to decline with increases in background knowledge as children grow up.

The Effects of Context

The Linguistic Context

More probable and less probable metaphorical sentences. In a series of experiments (Vosniadou, 1987; Vosniadou & Ortony, 1986; Vosniadou, Ortony, Reynolds, & Wilson, 1984) we examined how a linguistic context affects children's comprehension of metaphor. In these experiments preschool and elementary school children listened to stories which concluded with a metaphorical sentence and acted

out the stories and the metaphorical concluding sentences with toys in a toy-world environment. Metaphor comprehension was assessed on the basis of the children's enactments.

The linguistic context was manipulated by constructing two types of metaphorical sentences for each story. Both of these sentences provided a conclusion to the story but were different with respect to the likelihood of the particular story outcome they described. One of the metaphorical sentences described a relatively probable outcome, while the other described a less probable one.

The following is an example of one of the stories with its two metaphorical concluding sentences:

> Billy invited some of his friends to his house, so his mother baked some cookies. She told Billy not to eat the cookies before his friends arrived and she sent him to his room to play. Then she put the cookies in the cupboard and went out to the backyard. After his mother left, Billy came down. He opened the cupboard and found the cookies. He was ready to eat the first cookie when he heard his mother coming back in.
>
> More probable concluding metaphor:
> "Billy was a squirrel burying the nuts."
>
> Less probable concluding metaphor:
> "Billy was a squirrel heading for his tree."

The children acted out the stories with toy figures set on a 4 x 5-foot rectangular board. Seven miniature buildings (about 10 inches high, made of wood and realistically painted by an artist) were placed on the long sides of the board and represented a constant situational context. Different pieces were placed in the center of the board to accompany the particular story being read. For example, a piece representing the interior of a house was placed in the center of the board to go with the story about Billy and the cookies.

The degree to which the metaphorical concluding sentences represented more or less probable story outcomes was operationally defined in terms of the probability that a group of children would enact this particular outcome on the basis of contextual information alone. These probabilities were originally determined in a pilot study. They were further confirmed by a control group in which children listened to the stories without the metaphorical concluding sentences and enacted their own conclusions to them.

The results of this experiment showed that the predictability of the metaphorical concluding sentences was an important determiner of comprehension. All the children did considerably better with the more probable metaphors than the less probable metaphors. The difference was particularly noticeable in the case of the preschool children. As shown in Table 1, 85% of the preschool children were able to provide correct enactments for the more probable metaphorical sentences, whereas only 23% could do so with the less probable metaphors.

[Insert Table 1 about here.]

We interpreted the results of this experiment to suggest that children are capable of using the information contained in the linguistic context to draw inferences about the meaning of the linguistic input that might come next. When these inferences were consistent with the meaning of the linguistic input, metaphor comprehension was facilitated; when they were not, it was hindered.

Linguistic context and linguistic input. Because the context effects in this experiment were so strong we wondered whether the children paid any attention at all to the metaphorical sentences themselves.

Was it possible that the children ignored the metaphorical input and simply acted out the actions invited by the linguistic context?

A comparison between the experimental group (in which the children enacted stories that ended in metaphors) and the control group (in which the children enacted their own endings to the same stories) did not support this hypothesis. As shown in Table 2, there was a greater probability of enacting an outcome consistent with the meaning of the more probable metaphors by the children in the experimental group than by those in the control. This was not the case, at least for the preschool children, for the less probable metaphors. In fact, the probability of enacting an outcome consistent with the meaning of the less probable metaphors was higher in the control group than in the experimental group in the case of the preschool children. A 3 (Grade) x 2 (Experimental Group vs. Control Group) analysis of variance showed a main effect for group, $F(1,42) = 28.93$, $p < .001$, in the case of the more probable metaphors, and a main effect for group, $F(1,42) = 6.10$, $p < .01$ and grade $F(2,42) = 6.50$, $p < .01$, and a Grade x Group interaction, $F(2,42) = 3.14$, $p < .05$, in the case of the less probable metaphors.

[Insert Table 2 about here.]

These results demonstrated that the presence of the metaphorical sentences contributed to the number of correct enactments (either positively--in the case of the more probable metaphors--or negatively--in the case of the less probable metaphors) over and above the contribution of the linguistic context. We therefore concluded that metaphor comprehension resulted from the combined effects of both the linguistic input *and* the linguistic context.

Why did the children, and particularly the 4-year-olds, find the less probable metaphors so hard to enact? If we assume that the comprehension of the less probable metaphors required the revision of the hypotheses invited by the linguistic context, it could be argued that children's failure to enact those metaphors correctly was related to some difficulty in using the information contained in the linguistic input to revise contextually-based hypotheses.

This hypothesis was examined by looking at the performance of a literal control group in which children of comparable ages enacted the less probable outcomes expressed in literal language. These results showed that even the 4-year-old children were able to use the information contained in the literal sentences to revise their contextually-based hypotheses (Vosniadou, et al., 1984). From this we concluded that the children did not have problems in revising their contextually-based hypotheses on the basis of linguistic information. The problems appeared only when the linguistic input was a metaphor. Since metaphoricity by itself was also not a problem for the preschool children when the metaphorical sentences described more probable story outcomes, it was concluded that the difficulty the children experienced with the less probable metaphors arose not from difficulty in revising contextually-based hypotheses per se, neither from the presence of metaphorical language per se, but from the combination of the two.

Subsequent experiments showed that the less predictable metaphors could be enacted correctly by the 4-year-old children when their linguistic complexity was reduced (e.g., when they were turned into similes or when they involved fewer metaphorical substitutions). We interpreted this result to mean that the children operated under information processing limitations which limited the overall complexity of the linguistic input they could comprehend at a given time (this overall complexity being determined both by characteristics of the linguistic input itself and by the extrinsic context in which the linguistic input occurred). When the processing of the metaphorical sentences did not exceed these limitations, the metaphors were understood.

The Situational Context

Removing the situational context. One could argue that because of their limited linguistic knowledge young children could profit more from a situational context than from a linguistic context. Olson and his colleagues (Olson & Hildyard, 1980) suggested that young children may not be able to extract the meaning of a linguistic input based on linguistic information alone. Other work (e.g., Ackerman, 1984) indicated that children's difficulties may lie more in information processing limitations than any specific difficulty in interpreting a given linguistic input.

Experiments in our lab (Vosniadou & Ortony, 1986) have shown that when the situational context (i.e., the toy-world environment) is removed from the experimental setup, metaphor comprehension decreases (from about 50% correct to about 34% correct). Unfortunately, the removal of the situational context in these experiments was confounded with a change in the measure of metaphor comprehension from enactment to paraphrase. Because it was not possible to enact the meaning of metaphorical sentences without toys and a toy-world environment, the children were asked to paraphrase the metaphors in this experiment. In doing so, we confounded the absence of a situational context with a change in the measure of metaphor comprehension. As a result, we do not know whether the decrease in metaphor comprehension should be attributed to the removal of the situational context, to the change in the measure of metaphor comprehension, or to both.

Situational vs. linguistic information. In subsequent experiments we investigated the effects of the situational context by constructing a setup where the information conveyed by the situational context led to different predictions than the information conveyed by the linguistic context. We created such a conflict by presenting the children with literal referents for the terms used metaphorically. For instance, the toy world environment that accompanied the story referring to Billy as a squirrel hiding nuts, included not only a little boy doll depicting Billy but also a toy squirrel and some pretend nuts. Many preschool children were fooled by this setup, forgot Billy, the cookies, and the inferences invited by the linguistic context and enacted the metaphor by making the toy squirrel bury the pretend nuts. In these instances the situational context prevailed over the linguistic context.

It could be argued that the children were justifiably confused by our setup in this experiment. It is really rather unusual for the literal referents of terms used metaphorically to be present when a metaphor is used. For example, we do not usually use expressions such as "We'll cross the bridge when we come to it" figuratively when we are in sight of a real bridge! The presence of the literal toy referents may have biased the children towards thinking that the literal interpretation was the one intended by the experimenter. To the extent that such a misunderstanding occurred, it is still interesting to note that it was more likely to interfere with metaphor comprehension in the younger children than the older ones.

There is no doubt that we are still in the beginning stages of understanding how the extrinsic context might influence children's comprehension of metaphorical language. There are many questions raised by the existing research findings that need to be followed up further. Is it true that the situational context is more important than the linguistic context for metaphor comprehension in young children? When and under what circumstances are children capable of taking a linguistic context into consideration, and what exactly develops with age?

Background Knowledge

Some research has shown that preschool children are capable of paraphrasing or explaining metaphorical sentences in the absence of an extrinsic context (e.g., Billow, 1975; Keil, 1986; Malgady, 1977; Winner, Engel, & Gardner, 1980). In all cases where young children were found capable of comprehending metaphorical language in the absence of an appropriate situational or linguistic context, the metaphors used juxtaposed items with which young children were very familiar. It appears that when the items involved in metaphorical comparison are very familiar, the children can furnish the

information which is necessary in order to construct the metaphor's meaning on the basis of their background knowledge. In these cases the children do not need to have the extra information usually provided by an extrinsic context.

An experiment by Keil (1986) is particularly relevant to this point because it shows how important background knowledge is for metaphor comprehension to occur. When Keil asked children (5 to 9-year-olds) to explain the meaning of decontextualized metaphorical expressions, explanations were provided only for those metaphors juxtaposing items that belonged to conceptual domains the children had already differentiated. For instance, the younger children were capable of explaining metaphors based on a physical object/non-physical object distinction (such as "The car is dead") but not metaphors based on a physical/mental distinction (such as "The idea bloomed"). The physical/mental distinction is known to be acquired later than the physical object/non-physical object distinction (Keil, 1979). Furthermore, the range of metaphorical sentences that could be accurately paraphrased increased with age following parallel increases in children's conceptual knowledge.

Results such as these show that when children have the necessary background knowledge, they are capable of understanding metaphorical sentences in the absence of an extrinsic context.

Implications for a Developmental Theory

Context and the Literal Stage Hypothesis

We have argued that children are capable of using the information provided by the extrinsic or intrinsic context to facilitate their comprehension of nonliteral language. This argument has certain implications for a developmental theory of metaphor comprehension.

It has often been assumed that the development of metaphor comprehension is characterized by certain qualitatively distinct stages or steps (e.g., Asch & Nerlove, 1960; Cometa & Eson, 1976; Winner, Rosenstiel, & Gardner, 1976). In its simplest form this approach posits at least two such stages: a literal stage, during which children interpret figurative language literally, and a non-literal stage during which more sophisticated attempts at interpreting figurative language develop.

While children often interpret metaphorical language literally, a strict stage approach to the development of metaphor comprehension is not supported when the effects of context on comprehension previously discussed are taken into consideration. The studies by Vosniadou et al. (1984) on the comprehension of metaphors and similes, the studies by Keil (1986) and the experiments by Ackerman (1984) on irony, idioms and excuses, have shown that there is great variability in the ability of the same child to understand metaphorical language, a variability which is hard to explain in the context of a stage theory. For example, the findings by Vosniadou et al. (1984) that preschool children could not enact metaphorical sentences that occurred in a "less probable" context but could enact metaphors that occurred in a "more probable" context are inconsistent with a stage view of the development of metaphor comprehension. So are the results by Keil (1986) that the same children who understood the metaphor "The car is dead" could not understand the metaphor "The idea bloomed." In a stage developmental theory of metaphor these children should be placed in both the literal and the nonliteral stages of comprehension.

Furthermore, stage developmental approaches seem to rest upon certain questionable assumptions regarding the way metaphorical sentences are processed. Although they do not make any explicit claims about the underlying processes taking place during the metaphor comprehension task, they do assume that the process of metaphor comprehension starts with the computation of the metaphor's literal meaning. Such an assumption is necessary to support the primacy of the literal stage in development. If children were considered capable of deriving the metaphorical meaning without prior computation of the metaphor's literal meaning there would be no theoretical justification for a literal developmental stage.

The hypothesis that people first compute the literal meaning of a metaphor has not been supported by the literature. There is now a considerable body of evidence showing that the computation of a metaphor's literal meaning is not a necessary first step in the metaphor comprehension process (see Gibbs, 1984; Glucksberg, Guildea, & Bookin, 1982; Ortony, Schallert, Reynolds, & Antos, 1978).

Our Theoretical Framework

Based on findings such as the ones discussed above, (Vosniadou et al., 1984; Vosniadou, 1987) proposed a theoretical framework to explain the development of metaphor comprehension which takes context into account. Within this framework, it is assumed that the same fundamental processes underlie the development of literal and nonliteral uses of language. In both cases, the meaning of the linguistic input is not something that is given, but something that must be constructed on the basis of information provided both by the linguistic input and by the already established context. The success of this meaning construction process has been conceptualized to depend on the interaction between two interdependent sources of difficulty: (a) the complexity of the linguistic input with respect to its to-be-derived meaning, and (b) the predictability or transparency of the to-be-derived meaning with respect to the extrinsic context. When the combined effects of these two factors reach some point, which we have called the *difficulty limit*, comprehension failures may result.

All other things being equal, metaphorical inputs are expected to be more complex linguistically than their equivalent literal inputs because they require the additional operation of determining the referents of the terms used metaphorically. This additional linguistic complexity does not necessarily imply that metaphors should always take longer to process than their equivalent literal sentences or that metaphor comprehension should exceed the comprehension difficulty limit for young children. This depends on the particular items juxtaposed in the metaphor and children's background knowledge of these items. In addition, since the difficulty of a comprehension task depends on the combined effects of linguistic complexity and contextual predictability, what matters is not only how linguistically complex a metaphor is, but also in what extrinsic context it occurs. The factor of contextual predictability can lower the overall difficulty of a metaphor comprehension task and greatly enhance the possibility that young children will understand its meanings, as shown in Vosniadou et al. (1984).

Because young children have limited world knowledge one would expect them to rely more on information provided by the situational and linguistic context than older children and adults do. Given that their linguistic knowledge is also limited, one should expect them to make best use of the information contained in the situational context in which a metaphor occurs. The ability to use the information contained in the linguistic context should increase as children's linguistic knowledge develops. Our experiments have suggested that by the age of 4, children are already capable of using the linguistic context in which a metaphorical sentence occurs to form hypotheses about its possible meaning but that these hypotheses may be overrun by information coming from the situational context if the two are contradictory. Finally, the ability to create an appropriate interpretation for metaphorical inputs on the basis of background knowledge alone should also increase with age. This should happen not because children cannot use background knowledge to interpret metaphorical inputs, but because in many instances of metaphor comprehension this background knowledge is inadequate. Existing research clearly shows that the probability that children will provide accurate interpretations of decontextualized figurative expressions increases with age.

How Does the Extrinsic Context Facilitate Metaphor Comprehension?

The finding that context facilitates children's comprehension of metaphorical language should not be surprising. Many researchers of child language have suggested that children use the information provided by the extrinsic context to assign meanings to literal uses of language. In fact, this appears to be a major mechanism children use to break the linguistic code (Macnamara, 1972; Nelson, 1974; Olson & Hildyard, 1980). There is no reason to believe that context cannot play a similar role in the comprehension of metaphorical language.

More specifically, it appears that contextual information can eliminate two major obstacles in children's comprehension of metaphor: (a) the difficulty to distinguish literal from nonliteral linguistic inputs and (b) the difficulty in seeing the similarity between two items belonging to disparate domains. Children find it difficult to understand when a linguistic input should receive a nonliteral interpretation. As a result, they often interpret metaphors literally. This is the finding that has made researchers of metaphor conclude that children go through a literal stage in the development of their metaphor comprehension abilities. In addition to not being supported by the empirical evidence (as discussed earlier), the position that children go through a literal stage does little to actually explain why children provide literal interpretations of metaphors. An argument with more explanatory power is that children provide literal interpretations of metaphors because their knowledge base does not contain enough constraints to rule out such interpretations as nonsensical or inadequate. Children often lack the background knowledge necessary to understand that a literal interpretation of a figurative utterance is inappropriate. Their limited conceptual knowledge prevents them from placing adequate boundaries even between the possible and the impossible or the real and the imaginary. As a result, they are often likely to provide magical, literal, associative or otherwise incorrect interpretations of metaphors. Young children may actually believe that people can turn into stones or that sweet children taste sweet.

The information provided by the extrinsic context can sometimes fill in the gaps in children's incomplete knowledge base and provide them with just the information they need to understand that the literal interpretation of a metaphor is unacceptable. This is one of the ways in which the extrinsic context can facilitate metaphor comprehension. For instance, in the Vosniadou et al. (1984) experiments discussed earlier, the linguistic and situational context provided enough information to enable the children to understand that the sentence "Billy was a squirrel burying the nuts" did not mean that there was a real squirrel named Billy who buried some nuts. Indeed, no such interpretation was provided for this sentence even by the youngest children in our sample. When the situational context allowed such a possibility, however, many preschool children chose to interpret this metaphor literally.

Of course, understanding the meaning of a metaphor goes beyond the simple realization that a given linguistic input must be interpreted nonliterally. The listener must understand the specific meaning the speaker intends to convey by this linguistic input. In doing so, the listener must understand the hidden similarity between the two seemingly dissimilar items juxtaposed or explicitly compared in the metaphorical statement. The information contained in the linguistic and situational context can again help children understand the underlying similarity between the metaphorical terms. In the story about Billy, for example, the linguistic context can lead the listener to make the inference that Billy would try to hide the cookies. This inference makes it easier to understand the intended similarity between Billy hiding the cookies and a squirrel hiding nuts.

Conclusions

I have argued that metaphor comprehension is an interactive process that involves reliance on both the linguistic input and the context in which it occurs. Children can use the information provided by the extrinsic and intrinsic context to make hypotheses about the meaning of a metaphorical expression. In most cases such inferences increase children's chances of comprehending the metaphor, but it is possible that contextual information may lead to inferences that are inconsistent with the metaphor's meaning and thus hinder its comprehension.

At present, our understanding of the process thereby which children utilize contextual information to understand the meaning of a metaphorical input is rather limited. More research is needed to understand the circumstances under which contextual information is most likely to influence metaphor comprehension, the processes which children of various ages make use of contextual information, to understand a linguistic input, and the interaction among the linguistic context, the situational context, and background knowledge in the development of children's metaphor comprehension skills.

References

Ackerman, B. P. (1984). *Children's ability to make and modify excuse inferences about the use of an utterance*. Paper presented at the meeting of the American Psychological Association, Toronto, Canada.

Asch, S., & Nerlove, H. (1960). The development of double function terms in children: An exploration study. In B. Kapplan & S. Wapner (Eds.), *Perspectives in psychological theory*. New York: International University Press.

Billow, R. M. (1975). A cognitive developmental study of metaphor comprehension. *Developmental Psychology, 11*(4), 415-423.

Clark, H., & Carlson, T. (1981). Context for comprehension. In J. Long & A. Baddeley (Eds.), *Attention and performance, 9*. Hillsdale, NJ: Erlbaum.

Cometa, M. S., & Eson, M. E. (1976). Logical operations and metaphor interpretation: A Piagetian model. *Child Development, 48*, 649-659.

Gentner, D., & Stevens, A. (1983). *Mental models*. Hillsdale, NJ: Erlbaum.

Gibbs, R. W. (1984). Literal meaning and psychological theory. *Cognitive Science, 8*, 275-304.

Glucksberg, S., Gildea, P., & Bookin, H. (1982). On understanding nonliteral speech: Can people ignore metaphors? *Journal of Verbal Learning and Verbal Behavior, 21*, 85-98.

Johnson-Laird, P. N. (1983). *Mental models*. Cambridge, MA: Harvard University Press.

Keil, C. (1979). *Semantic and conceptual development*. Cambridge, MA: Harvard University Press.

Keil, F. (1986). Conceptual domains and the acquisition of metaphor. *Cognitive Development, 1*, 73-96.

Macnamara, J. (1972). The cognitive basis of language learning in infants. *Psychological Review, 79*, 1-13.

Malgady, R. G. (1977). Children's interpretation and appreciation of similes. *Child Development, 48*, 1734-1738.

Nelson, K. (1974). Concept, word and sentence: Interrelations in acquisition and development. *Psychological Review, 81*, 267-285.

Olson, D. R., & Hildyard, A. (1980). *Literacy and the comprehension of literal meaning*. Paper presented at the conference "The development and use of writing systems." Bielefeld, Germany, June 19-22.

Ortony, A., Schallert, D. L., Reynolds, R. E., & Antos, S. T. (1978). Interpreting metaphors and idioms: Some effects of context on comprehension. *Journal of Verbal Learning and Verbal Behavior, 17*, 465-477.

Rumelhart, D. E., & Ortony, A. (1977). The representation of knowledge in memory. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 415-431). Hillsdale, NJ: Erlbaum.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding.* Hillsdale, NJ: Erlbaum.

Swinney, D., & Cutler, A. (1979). The access and processing of idiomatic expressions. *Journal of Verbal Learning and Verbal Behavior, 18,* 427-440.

Vosniadou, S. (1987). Children and metaphors. *Child Development, 58,* 290-341.

Vosniadou, S., & Ortony, A. (1986). Testing the metaphoric competence of the young child: Paraphrase vs. enactment. *Human Development, 29,* 223-224.

Vosniadou, S., Ortony, A., Reynolds, R. E., & Wilson, P. T. (1984). Sources of difficulty in children's comprehension of metaphorical language. *Child Development, 55,* 1588-1606.

Winner, E., Engel, M., & Gardner, H. (1980). Misunderstanding metaphor: What's the problem? *Journal of Experimental Child Psychology, 30,* 22-32.

Winner, E., Rosenstiel, A. K., & Gardner, H. (1976). The development of metaphoric understanding. *Developmental Psychology, 12,* 289-297.

Author Notes

I would like to thank Raymond Gibbs and Richard Gerrig for helpful comments on a previous draft.

Table 1

Mean Proportion of Correct Enactments

Grade	More Probable Outcome	Less Probable Outcome
Preschool	.85	.23
First	.90	.45
Third	.93	.68

Table 2

Mean Proportion of Correct Enactments

Grade	Experimental Group	Control Group
More Probable Outcome		
Preschool	.85	.50
First	.90	.55
Third	.93	.70
Less Probable Outcome		
Preschool	.23	.30
First	.45	.20
Third	.68	.35

EDITORIAL ADVISORY BOARD
1988-89

Beck, Diana

Commeyras, Michelle

Foertsch, Daniel

Hartman, Doug

Jacobson, Michael

Jihn-Chang, Jehng

Jimenez, Robert

Kerr, Bonnie

Kerr, Paul

Meyer, Jennifer

Moran, Juan

Ohtsuka, Keisuke

Roe, Mary

Schommer, Marlo

Scott, Judy

Stallman, Anne

Wilkinson, Ian

Wolff, Phillip

MANAGING EDITOR
Mary A. Foertsch

MANUSCRIPT PRODUCTION ASSISTANTS
Delores Plowman
Nancy Diedrich